PQ metering: Challenges for distribution & solutions

28th Nov 2015

SECURE

International Copper Association India
Copper Alliance

ASIA POWER QUALITY INITIATIVE

What & why?

- **IEC 61000-4-30 edition 3**
  - RVC affecting productivity
  - Current monitoring & recording
  - Transient: useful but not mandatory

- **Why measurements & monitoring?**
  - detect source & error conditions
  - “early warning” system (like intermittent ground fault)
  - fluctuation & harmonic level monitoring to enable effective grid planning
  - With wind, solar addition to grid, ensuring no additional disturbance

Challenges in distribution

- Voltage fluctuations
- Flickers
- Supply-demand balance
- Power line quality: “measurement & monitoring are first set steps to control”
- Higher failure and cable damage rate! Neutral overshoot

Considerations

- **Utility should:**
  - consider critical nodes & points to monitor
  - consider flow sequence for possible failures
  - look at scalable, centralised configuring & monitoring system (for disturbance occurrence & flow)
  - consider analysis for long term horizon (years of data to set a trend)
  - consider remote communication for continuous monitoring

- **Permanent installations:**
  - Fixed equipment: monitoring and analyzing events to plan remedy
  - Detect impending problems before aggravating far-reach consequences
  - Portable: best suited for troubleshooting

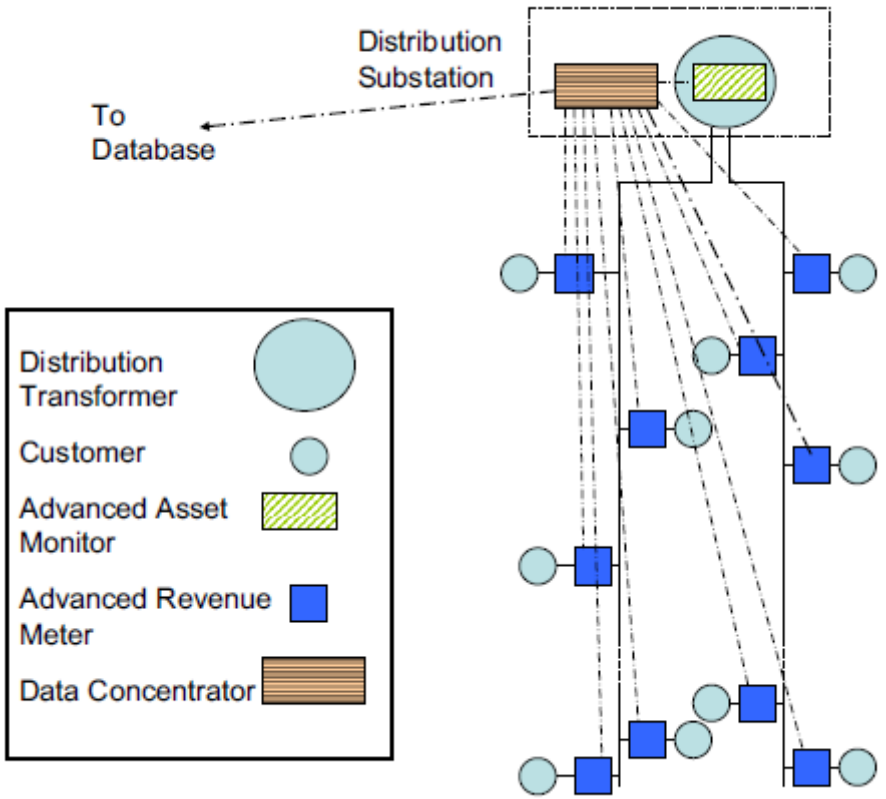
LV, HV, MV considerations (benefits vs cost)

- Economies of scale
  - LV sites (consumer points)
  - Impact of domestic level emissions
- Zone substations
  - Relative trend of PQ levels
  - PQ contractual obligations
  - Unbalance and harmonics check
- MV/HV sites
  - Sag emissions
  - 33kV and above sites
  - Capacitor bank effect on w/f distortion
  - Large industrial loads

Accuracy and Class

- **Governance**
  - Clarity between normative (class A) or indicative (class S) measurements
  - Strict guidelines for normative; suited for
    - Disputes
    - Inspections
    - Measurements for design of protections
    - Compliance with IEC 61000-4-30 Class A
- **Measurement compliance specific**
  - flicker & harmonic measurements
  - anti-aliasing filter for high frequency cut-off
  - certification check is critical for assurance
  - labs in US and Europe

Suggested scenario



Benefits to distribution utilities

- Energy & peak demand mgmt
- Fault recording
- Asset management
- N/w operation & reliability benefits
- Generation